# CHAPTER III

# RESEARCH METHODOLOGY

This chapter elaborates methodology of the research as previously mention in chapter 1. Briefly, this chapter includes the explanation of the research design, data collection, population and sample, procedure of conducting the treatment, and procedure of data analysis.

## 3.1 Research Design

The design of the research was a quasi experimental design. Quasi experimental design was used in the research because it enables the researcher to undertake the study with groups that were intact class (Fraenkel and Wallen, 1990: 242). Since the research design was a quasi experimental design, there were two groups taken as the investigated groups in the research. Fraenkel and Wallen (1990) explain the design as the comparison group design. Both groups were classified as different groups because the first group would be the experimental group while the second group would be the control group. The experimental group received mind mapping technique as its treatment but the control group was not given any treatment.

In the control group, the students were taught by using conventional method. The teacher used lesson plan and classroom activities implemented by the school. Meanwhile in teaching experimental group, the teacher used mind

mapping technique as the treatment in classroom activities and lesson plan in teaching learning process.

Before conducting the treatment, both groups would be given the pretest at the beginning of the research. Then, the posttest would also be given to both groups at the end of the research. Pretest and posttest non equivalent group design is often used in classroom experiments when experimental and control groups are such naturally assemble groups as intact classes which may be similar (Hatch and Farhady, 1982: 22). The pretest was important to be conducted in the research to check initial ability of the students; whether the students in the experimental and control groups have similar ability in reading descriptive text or not. The posttest was given to both groups to investigate whether or not mind mapping technique as the implemented method gave some effects in teaching learning process.

In this chapter, the research design can be formulated as follows:

**Table 3.1**

| Groups | Pretest | Treatment | Posttest |
|---|---|---|---|
| Experimental | $R_{1E}$ | √ | $R_{2E}$ |
| Control | $R_{1C}$ | | $R_{2C}$ |

$R_{1E}$: students' reading ability of the experimental group in the pretest

$R_{1C}$: students' reading ability of the control group in the pretest

$R_{2E}$: students' reading ability of the experimental group in the posttest

$R_{2C}$: students' reading ability of the control group in the posttest

Referring to the research design above, treatment was only given to the experimental group. Pretest was conducted before the implementation of mind mapping technique as the treatment and then at the end of the treatment period, posttest was administered to evaluate student understanding in reading descriptive text.

Accordingly, there were two variables that would be investigated in this experimental research namely a dependent variable and an independent variable. An independent variable is the variable which influences dependent variable; meanwhile a dependent variable is the variable that will be affected by an independent variable (cited in Coolidge, 2000: 15). Based on the explanation above, mind mapping technique would be the independent variable (the major variable to be investigated), while students' reading ability would be the dependent variable (the variable which is observed and measured to determine the effect of the independent variable).

In addition, the hypotheses (restatement of the research question) in the research were in the form of null hypothesis ($H_0$) and alternative hypothesis ($H_A$). Null hypothesis states that there is no difference in mean adjustment level between those who received mind mapping technique and those who did not. By using null hypothesis, every possibility of the research can be shown. If the null hypothesis was accepted, it can be concluded that the treatment did not work. While, if the alternative hypothesis was accepted, it means that the treatment works well. In other words, alternative hypothesis states that there is a difference between those who received mind mapping technique and those who did not.

The hypotheses can be seen as follows:

$H_0 = \mu 1 = \mu 2$

$H_A = \mu 1 \neq \mu 2$

## 3.2 Data Collection

An instrument can be used as the device in the process of data collection. Fraenkel and Wallen (1990: 90) state that an instrument is the main device used to gather the data. As a tool in collecting the data, an instrument should be able to present the whole information which is needed in the research. In other words, the instrument that would be used in the research should be valid and reliable. In line with this, Creswell (1994: 121-122) states that pilot test or field testing is important to conduct in a research.

According to Creswell (1994: 121-122), each item in a test instrument must be checked in the pilot test to make sure that those items meet the validity and reliability. It was important to be conducted because it was used as the reflection in making some revisions or changes in the test instrument. However, in the research, the pilot test was conducted to check the reading test instrument.

Furthermore, the pilot test in the research had been conducted before the test instrument was given to the experimental and control groups in the pretest and posttest. It has conducted on December 21$^{st}$ 2009. The total items of reading test in the pilot test were 45 questions. It was tried out to the students with the same level out of sample of the research. The participants were the seventh grade students in SMPN 15 Bandung, consist of 35 people.

As the next step, after meeting the validity and reliability of the test instrument, the pretest and the posttest would be conducted in the research study. Pretest and posttest are tools in an experiment that can be used to obtain measurement of the study (Creswell, 1994: 129). The pretest was conducted at the beginning of the research. Then, the treatment of mind mapping technique as the implemented method was administered in the experimental group. Last but not least posttest was administered at the end of the research.

The collected data were the scores obtained from pretest and posttest that were given both to the experimental and control groups. The pretest was administered in both groups to describe the similar ability of experimental and control groups before conducting the treatment. On the other hand, the scores from the posttest were used to measure whether the implemented method influences the experimental group or not. All items of reading test were the same. It consisted of thirty multiple choice questions. It was composed based on the standard in Indonesia curriculum of teaching English for the seventh grade of Junior High School.

The following table is the syllabus for seventh graders in reading aspect that was taken as the considerations in formulating test instrument.

**Table 3.2**

**The Competencies and Indicators of Items in Reading Test**

| Aspect | Standard Competence | Basic Competence | Indicator | Number of Item |
|---|---|---|---|---|
| **Reading** | Understanding meanings in simple functional written text and short essay in the form of descriptive and procedural text relate to the environment | • Giving response to the meaning and the rhetorical stage in essay accurately, clearly and appropriately relates to the environment in the descriptive and procedural text | • Identify type of the text<br>• Identify the adjectives which consist in the text<br>• Identify main idea of the text<br>• Identify the communicative purpose of the text<br>• Identify the organization of the text<br>• Identify contents of the text<br>• Identify function of sentence in the text<br>• Identify function of paragraph in the text | **18**<br>**8**<br>**1, 12, 13, 26**<br>**2, 21, 27**<br>**6**<br>**3, 4, 5, 7, 9, 10, 11, 14, 15, 16, 17, 19, 20, 24, 25, 29, 30**<br>**23**<br>**22, 28** |
| | | • Reading aloud and meaningful functional text and a very simple short essay in the form of descriptive and procedural by using acceptable utterance and intonation | | |

In addition, to answer the second and the third research questions and as the attempt in supporting the validity of the collected data, an open interview (non test instrument) was administered to the students. It was conducted to observe the students' perception on the obstacles in learning descriptive text by using mind mapping technique and also to investigate the advantages and the disadvantages of mind mapping technique. It aimed in getting a description about information related to the process of the implementation of mind mapping which was not described in the results of reading test instruments pretest and posttest. It can also be used in drawing conclusion related to the students' behavior or response concerning the implementation of mind mapping. Five open-ended questions were asked to the students of the experimental group after the posttest was conducted.

### 3.2.1 Population and Sample

According to Fraenkel and Wallen (1990: 66), sample in the research study refers to any group on which information is obtained; it is usually smaller than the population. Meanwhile population is the group to which the results of the study are intended to apply; it is also the group on which the researcher would like to generalize the result of the study. Commonly, the research only used sample since the researcher rarely has access to all member of the population.

In the research, the population was the seventh grade students of SMP 12 Bandung which consist of eight classes, enrolled in academic 2009/ 2010. Since sample of the research was smaller than population, the research was not used all members of the population. Thus, the research only used two classes as the sample

of the research. The first class, 7A was the experimental group and the other, 7C was the control group. Each class consists of 41 students; therefore the total number of the students of the study was 82 students. In addition, the researcher just involved 35 students from each class as the sample of the research. It was done to anticipate the absence of some students during the research. So the fix number of the sample was 70 students.

### 3.2.2 The Procedure of Conducting the Treatment

#### 3.2.2.1 Organizing Teaching Procedure

In the research, both classes were taught by the researcher. In preparing the teaching process, the researcher carried out two steps. The first step was preparing the appropriate materials for teaching and learning process during the experiment. Then, as the second step, the researcher organized teaching procedures in control and experimental group.

Moreover, teaching materials and procedures in the experimental group was highly related to the mind mapping technique in teaching descriptive text. While in the control group, the conventional method was used in teaching learning process.

#### 3.2.2.2 Conducting the Treatment

In conducting the treatment, experimental group was taught by using mind mapping technique as mention previously. The treatments were conducted in several meetings. On the other hand, the control group was not given mind

mapping as the treatments. They learned descriptive text by using conventional method. Nevertheless, both groups were in similar condition, the only thing which was different related to the technique that was implemented in the experimental group.

**Table 3.3**

**Schedule of the Research**

| NO. | Experimental Group | | Control Group | |
|---|---|---|---|---|
| | **Date** | **Material** | **Date** | **Material** |
| **1.** | 11th January 2010 | **Pretest** Introduction of descriptive text (based on the language feature and grammatical structure) and Mind Mapping technique | 13th January 2010 | **Pretest** Introduction of descriptive text |
| **2.** | 13th January 2010 | Making mind mapping from the text entitled San Francisco and answering some questions based on the text | 14th January 2010 | Language structure and grammatical feature in a descriptive text |
| **3.** | 18th January 2010 | Making mind mapping from the text entitled My Best Friend and answering some questions based on the text | 20th January 2010 | Reading aloud a text about San Francisco and identify main idea and adjectives consist in the text |

| | | | | |
|---|---|---|---|---|
| **4.** | 20th January 2010 | Making mind mapping from the text entitled My School Library and answering some questions based on the text | 21th January 2010 | Answer and discuss the question from the text entitled San Francisco |
| **5.** | 25th January 2010 | Making and presenting mind mapping from the text entitled Polar Bear based on language feature, grammatical structure and contents of the text (**Review**) | 27th January 2010 | Review of Simple present tense and language feature in the descriptive text |
| **6** | 27th January 2010 | **Posttest and administering interview** | 28th January 2010 | **Posttest** |

### 3.3 Data Analysis

#### 3.3.1 Scoring Technique

The instrument used in the research was in the form of multiple-choice questions. The data were collected by using research instrument. After the data were collected, then the data would be analyzed by using scoring technique formula.

In the research, the formula which was used to analyze pretest and posttest data was as follows:

S = R

Where,

S: Score

R: Right answer

### 3.3.2 Data Analysis on the Pilot Test

The pilot test data were analyzed to measure the validity, reliability, level of difficulty and the discrimination level of the instrument.

**Validity Test**

It is important to try out the test instrument and compute the result with an appropriate formula of validity. Fraenkel and Wallen (1990: 139) state that validity refers to the appropriateness, meaningfulness, and usefulness of the specific assumptions that researcher makes based on the data collected. In order to measure the criterion related to the validity of the test, Pearson Product Moment was used in the research. It can be used to analyze the validity of each item. The data were calculated by SPSS 17 for windows. The criteria for the validity test were stated as follows:

**Table 3.4**

**r Coefficient Correlation (Validity)**

| Raw Score | Interpretation |
|---|---|
| 0.800-1.00 | Very High |
| 0.600-0.800 | High |
| 0.400-0.600 | Moderate |
| 0.200-0.400 | Low |
| 0.00-0.200 | Very Low |

**(Arikunto, 2007:147)**

**Difficulty test**

Fultcher and Davidson (2007, cited in Rahayu, 2009) mention that difficulty is defined as the proportion of the test takers who answer the items correctly. Then, in the test itself, test instrument can be accepted as a good test if it is not too easy or too difficult for the population for whom the test will be assigned. An ideal item has the facility values around 0.5, with an acceptable range being from 0.3-0.7 (Henning, 1987: 50 cited in Fultcher and Davidson, 2007)

**Discrimination**

The level of discrimination indicates that the extent to which the items of the test distinguishes between the participants, separating the more able participant from the less able one (Heaton, cited in Rahayu 2009). The most commonly used method of calculating item of discrimination is the point biserial correlation. This is a measure of association between responses to any specific items on the whole test (Henning, 1987 cited in Fulcher and Davidson, 2007).

The statistical computation will be as follows:

$$r_{pbi} = \frac{\bar{X}_p - \bar{X}_q}{S_x}\sqrt{pq}$$

$r_{pbi}$ = point biserial correlation

$\bar{X}_p$ = Mean score on the test for those who get the item correct

$\bar{X}_q$ = Mean score on the test for those who get the item incorrect

$S_x$ = Standard deviation of test score

p = the proportion of test takers who get the item correctly (facility value)

q = the proportion of test takers who get the item incorrect

Items with $r_{pbi}$ of 0.25 or greater are considered as acceptable, while those with lower value was rewritten or excluded from the test (Henning, 1987 cited in Fulcher and Davidson, 2007).

**Reliability Test**

It is also important to investigate the reliability of the test instrument. Hatch and Farhady (1982: 224) define reliability as the extent to which a test produces consistent result when administered under similar condition. A test can be accepted as a reliable test if it can be a consistent test to obtain the scores.

Reliability always depends on the content to which an instrument was used. Based on the context, an instrument may or may not submit reliable scores. In the research, the reliability of instrument was measured by using Cronbach's alpha formula in SPSS 17 for windows. From the other reliability tests, Cronbach's alpha is the most widely used and the most suitable test in the research (Vaus, 2002: 21). Then, a reliable set of item usually has an alpha of 0.7.

### 3.3.3 Data Analysis on Pretest and Posttest

The data which were obtained from the pretest and posttest were used to investigate students' initial ability in reading and then it would be analyzed by the independent sample *t*-test statistics. Beforehand, hypothesis was stated with the alpha 0.05. Hatch and Farhady (1982: 114) state that there should be certain assumptions in doing statistical test, they are: only one group is as the subject in the experiment, the scores on independent variable are continuous, and the scores

are normally distributed, while variances of score are equal. In other words, *t*-test calculation can be done if the data is normally distributed and the variances are equal. Thus, test of normal distribution and the homogeneity of variance were done before the *t*-test calculation.

In analyzing the normal distribution, Kolmogorov-Smirnov test was used in the data analysis. Meanwhile, Levene Test formula in SPSS 17 was used to analyze the homogeneity of variance. As the next step in analyzing the pretest data, the researcher used independent sample *t*-test to test the null hypothesis ($H_0$) whether or not any difference between control group and experimental group students' initial ability in reading. Independent sample *t*-test was also conducted in analyzing the posttest scores of control and experimental group students to compare mean of both groups. Then the calculation of effect size was conducted by using $t_{obt}$ from the independent sample *t*-test of posttest.

Besides, matched *t*-test was also used in the research following the nearly steps as in comparing pretest of both groups. It was conducted to investigate whether or not the difference of pretest and posttest means of each group is significant. Clearly, the computation of scores of pretest and posttest for the experimental group was conducted to find the level of the reading ability of students of the group before and after mind mapping implementation. Furthermore, to check the level of effect of the treatment, test of effect size was administered after *t*-test calculation.

Calculation of the effect size is important to be administered to determine the effect of the influence of independent variable upon the dependent variable

(Coolidge, 2000: 151). It is calculated to investigate how important the effect of the independent variable in practical terms. If the treatment works well then there will be a large effect size.

The formula of effect size is:

$$r = \sqrt{\frac{t^2}{t^2+df}}$$

**Where:**

r = effect size

t = $t_{obt\ or}$ t value from the calculation of the independent t-test

df = $N_1 + N_2 - 2$

After the value of r has been obtained, the scores were matched with the following scale to interpret the effect size.

**Table 3.5**

**Effect Size Value**

| Effect Size | r value |
|---|---|
| **Small** | **.100** |
| **Medium** | **.243** |
| **Large** | **.371** |

**(Coolidge, 2000: 151)**

### 3.3.4 Data Analysis on Interview

The interview data were transcribed to obtain the information about mind mapping implementation from the students' point of view. The administering of interview was aimed to find out the obstacles, advantages and disadvantages of mind mapping technique which had been used in learning descriptive text. The interpretation of interview result would be given in the next chapter.